

FORM PTO-1390 (Modified) (REV 11-2000)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER 214771US0PCT	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR) <div style="font-size: 1.5em; font-weight: bold; text-align: center;">09/926318</div>	
INTERNATIONAL APPLICATION NO. PCT/FR00/00937		INTERNATIONAL FILING DATE 12 April 2000		PRIORITY DATE CLAIMED 14 April 1999	
TITLE OF INVENTION FIBROUS REINFORCING MATERIAL FOR BITUMINOUS MIXES, PROCESS FOR PRODUCING IT AND USE THEREOF					
APPLICANT(S) FOR DO/EO/US ROSSI Francesco et al.					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
<ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. <input checked="" type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (24) indicated below. 4. <input checked="" type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31). 5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371 (c) (2)) <ol style="list-style-type: none"> a. <input type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau). b. <input checked="" type="checkbox"/> has been communicated by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US). 6. <input checked="" type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)). <ol style="list-style-type: none"> a. <input checked="" type="checkbox"/> is attached hereto b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4). 7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3)) <ol style="list-style-type: none"> a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau). b. <input type="checkbox"/> have been communicated by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input checked="" type="checkbox"/> have not been made and will not be made. 8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). 9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)). 10. <input checked="" type="checkbox"/> An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)). 11. <input type="checkbox"/> A copy of the International Preliminary Examination Report (PCT/IPEA/409). 12. <input checked="" type="checkbox"/> A copy of the International Search Report (PCT/ISA/210). 					
Items 13 to 20 below concern document(s) or information included:					
<ol style="list-style-type: none"> 13. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98. 14. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included. 15. <input type="checkbox"/> A FIRST preliminary amendment. 16. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment 17. <input type="checkbox"/> A substitute specification. 18. <input type="checkbox"/> A change of power of attorney and/or address letter. 19. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825. 20. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4). 21. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4). 22. <input type="checkbox"/> Certificate of Mailing by Express Mail 23. <input checked="" type="checkbox"/> Other items or information: 					
Request for Consideration of Documents Cited in International Search Report/Notice of Priority PCT/IB/304/Drawings (1 Sheet)/PCT/IB/308 Amended Sheets (Pages 9, 12, 13, and 14)					

U.S. APPLICATION NO (IF KNOWN, SEE 37 CFR 1.492 (a)(1) - (5)) : 09/926318		INTERNATIONAL APPLICATION NO PCT/FR00/00937		ATTORNEY'S DOCKET NUMBER 214771US0PCT	
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24. The following fees are submitted:				CALCULATIONS PTO USE ONLY	
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) : <input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1040.00 <input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$890.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$740.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$710.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00					
ENTER APPROPRIATE BASIC FEE AMOUNT =					
Surcharge of \$130.00 for furnishing the oath or declaration later than _____ <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).				\$890.00	
				\$130.00	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	23 - 20 =	3	x \$18.00	\$54.00	
Independent claims	2 - 3 =	0	x \$84.00	\$0.00	
Multiple Dependent Claims (check if applicable). <input checked="" type="checkbox"/>				\$280.00	
TOTAL OF ABOVE CALCULATIONS =				\$1,354.00	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				\$0.00	
SUBTOTAL =				\$1,354.00	
Processing fee of \$130.00 for furnishing the English translation later than _____ <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (f)).				\$0.00	
TOTAL NATIONAL FEE =				\$1,354.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). <input type="checkbox"/>				\$0.00	
TOTAL FEES ENCLOSED =				\$1,354.00	
				Amount to be: refunded	\$
				charged	\$

a. ☒ A check in the amount of **\$1,020.00** to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of _____ to cover the above fees. A duplicate copy of this sheet is enclosed.


c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **15-0030** A duplicate copy of this sheet is enclosed.

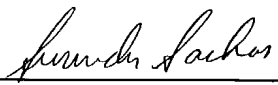
d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Surinder Sachar
Registration No. 34,423


22850


 SIGNATURE
Norman F. Oblon
 NAME
24,618
 REGISTRATION NUMBER
Oct. 12 2001
 DATE

i/ppts

09/926318

FIBROUS REINFORCING MATERIAL FOR BITUMINOUS MIXES,
PROCESS FOR PRODUCING IT AND USE THEREOF

5 The subject of the present invention is a fibrous reinforcing material for bituminous mixes used for road pavements and a process for producing the said material.

10 As known, bituminous mixes used for road pavements are mainly mixtures of inert materials and bitumen, also known as asphaltic mixes or agglomerates.

For example, in the case of bituminous mixes of the "draining" or "antiskid" type, the inert materials are mixtures of crushed basaltic stone, sand and calcareous filler.

15 The bitumen which binds the said inert materials is a mixture of hydrocarbons having a high molecular mass modified so as to have a high viscosity.

20 Bituminous mixes for road pavements have been the subject of various studies trying to improve their resistance to the applied loads and to the various atmospheric and environmental conditions, such as their permeability or their drainability. The purpose of this is to increase the safety of motorists and to reduce the handling costs.

25 In particular, it has been endeavoured to increase the quality of these bituminous mixes by introducing various fibres into them.

30 Potentially, fibres have the capability of improving the resistance of the mixes at least to cracking and to crack propagation, in so far as they can form a kind of microreinforcement which extends through the bitumen.

35 More particularly, cellulose fibres or in general plant-based fibres, wool fibres, rock fibre or glass wool, and mixtures thereof, have been used.

These experiments have, for various reasons, not given satisfactory results, even if they have provided certain advantages.

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For example, plant-based or cellulose fibres are natural materials, but when they absorb water they degrade and bring about a loss of cohesion between the granules of the mixes.

5 In practice, this phenomenon results in a significant loss of mechanical strength of the mixes during their ageing due to the fact that water is gradually absorbed over time.

10 Glass wool fibres have a diameter of between approximately less than one and about three thousandths of a millimetre and have a very variable length. Rock wool fibres have the same dimensions - they are obtained by melting mainly sedimentary rocks - and have the feature of being very brittle.

15 As a whole they undergo no damage due to the presence of moisture, but their size, particularly in the case of fragmentation, may be dangerous to humans and to the environment.

20 This is because, as the asphalt gradually deteriorates, these fibres, and especially their fragments, spread partly in the air and can come into contact with humans, and even be inhaled, causing various irritations.

25 Another drawback of these fibres is their tendency not to be spread uniformly in the bituminous mixes, but rather to remain in the substantially surface layers of the latter.

30 Finally, another drawback of the current technique is the total cost incurred by adding these fibres. In fact, their cost is of the order of a few thousand lira per kilogram of fibre.

35 Considering that the quantities used are several kilograms of fibre for each tonne of bituminous mix and that a single cubic metre of bituminous mix has a weight of about three tonnes, it will be understood that producing a road pavement like that for a motorway entails a considerable expense because of these fibres.

In short, the technical problem of reinforcing bituminous mixes for road pavements with fibres which

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are strong, stable and reliable over time, able to be mixed correctly with the mixes, which are not a health hazard and have a relatively low cost remains unsolved.

5 The technical objective of the present invention is to devise a fibrous reinforcing material and a process for obtaining it which can solve the said technical problem and can substantially remedy the abovementioned drawbacks.

10 This technical objective is to a large part achieved by means of a fibrous reinforcing material for bituminous mixes used for road pavements, characterized in that it is obtained mostly from glass filaments having a diameter of greater than or equal to five micrometres and a length of greater than or equal to
15 six millimetres.

According to advantageous characteristics:

- the material is in the form of flakes;
- the said filaments are made of E-type glass consisting essentially of a calcium aluminium borosilicate with a low alkali content;
- 20 • the material comprises a mixture of glass filaments of different diameters;
- the material comprises glass filaments of two different diameters in approximately equal quantities by weight;
- 25 • the said glass filaments come from chopped glass yarns;
- the said filaments have a minimum diameter of greater than or equal to five micrometres and a maximum diameter of less than or equal to
30 twenty-four micrometres;
- the said filaments have a mean diameter of between ten and fifteen micrometres;
- the said filaments have mainly a so-called
35 minimum length of greater than or equal to six millimetres and a maximum length of less than or equal to twenty millimetres;
- the said filaments (2) have a mean length of between ten and twelve millimetres.

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The subject of the invention is also a process for manufacturing a fibrous reinforcing material for bituminous mixes used for road pavements, characterized in that it comprises: a selection step in which glass
5 yarns consisting of filaments having a diameter greater than or equal to a minimum diameter of five micrometres and less than or equal to a maximum diameter of twenty-four micrometres are selected; and a milling step during which the said yarns are chopped into
10 filaments having mostly a length of greater than or equal to six millimetres.

According to advantageous characteristics:

- in the said milling step, the chopped filaments agglomerate in the form of flakes;
- 15 • in the said selection step, the said glass yarns are chosen from production scrap or waste;
- in the said selection step, yarns made of E-grade glass are chosen;
- 20 • in the said selection step, "textile" glass yarns and "roving" glass yarns are chosen;
- the said yarns are metered in approximately equal quantities by weight;
- 25 • yarns of different diameters, chosen so as to obtain a mean diameter of between ten and fifteen micrometres are selected;
- during the milling step, the said yarns are chopped into filaments having a mean length of between ten and twelve millimetres;
- 30 • the milling step is carried out using a chopper with rotating blades.

The subject of the invention is also the use of a fibrous material produced as above, in which the said fibrous material is introduced as reinforcing material
35 into bituminous mixes for road pavements.

Finally, the subject of the invention is a bituminous mix for road pavements, of the type comprising bitumen and a mixture of inert materials,

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characterized in that it contains a fibrous reinforcing material according to the invention.

We will now describe, by way of non-limiting example, a preferred embodiment of the invention, illustrated in the appended drawing in which the single figure shows, through a flow diagram, how the novel process for producing the fibrous material according to the invention is carried out.

Referring to the drawing, the reinforcing fibre for bituminous mixes used for road pavements is indicated overall by the reference number 1.

It is produced in a novel way by glass filaments 2 which are essentially in fragments of glass yarns 3, especially of chopped or milled yarns, consisting of filaments having a diameter of greater than five micrometres (thousandths of a millimetre) and having a length of greater than six millimetres.

According to this example, the filaments 2 are all made of E-type glass. It is known that E-type glass has excellent strength properties and a high elastic modulus, together with a high melting point.

In short, it may be defined as a calcium aluminium borosilicate which is characterized by a very low alkali content.

In more detail, the precise composition of the E-glass used for the filaments 2 is as follows:

- silica (SiO_2) : 52-56% by weight;
- calcium carbonate (CaO) : 16-25% by weight;
- alumina (Al_2O_3) : 12-16% by weight;
- boron trioxide (B_2O_3) : 5-10% by weight;
- various (MgO , Na_2O , K_2O , Fe_2O_3 , TiO_2 , ZrO_2 , SrO , SO_3 , CrO , FeO): the balance to 100.

With regard to the dimensions, the filaments 2 have approximately constant diameters of between the said minimum diameter of greater than or equal to five micrometres and a maximum diameter of less than or equal to twenty-four micrometres.

Furthermore, the diameters and the distribution of the filaments are preferably chosen so that the

dispersion of the filaments 2 at all levels of bitumen and of bituminous mix is ensured in a novel manner.

As regards length, the filaments 2 have substantially a minimum length of greater than or equal to six millimetres and a maximum length of less than or equal to twenty millimetres.

The filaments 2 preferably have a mean length of between ten and twelve millimetres.

This mean length is particularly advantageous.

This is because it has been demonstrated experimentally that the short lengths increase the volatility of the filaments and give rise to poor cohesion of the bituminous mix. In other words, the reinforcing or binding function for which the fibre exists is reduced.

On the other hand, excessive lengths result either in possible fracture of the filaments or in substantial difficulty in mixing or dispersing the fibres within the bituminous mix.

In contrast, a reinforcing fibre (or material) 1 comprising filaments of the said mean length or in all cases having a length of between the minimum and the maximum length indicated, gives excellent results in terms of ability to provide cohesion, in terms of ease of dispersion and in terms of integrity.

Furthermore, the dimensions indicated above are advantageous in that they allow the filaments to agglomerate or become entangled in the form of flakes which show good dispersion in a bituminous mix.

It should be pointed out that, although it is possible to chose the diameters of the filaments precisely, in the case of the lengths there is always a certain quantity of fragments having unpredictable dimensions.

The invention furthermore comprises a novel process for producing the reinforcing fibre described above.

According to the novel process, it is envisaged in an original manner that the fibrous reinforcing

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material is made from glass yarns already produced and preferably from production scrap or waste, when this waste is not due to qualitatively essential aspects of the yarns.

5 Advantageously, the reinforcing material 1 is moreover made from a mixture of several glass yarns of different diameters and consistency, which yarns are checked from the standpoint of their quality and dimensions and contain no foreign matter.

10 In particular, it is advantageous to start with a mixture of the said "textile" yarn 3a and the said "roving" yarn 3b.

 The first steps of the process, illustrated in the figure, are specifically "textile" yarn 3a and
15 "roving" yarn 3b selection steps 4a, 4b, respectively.

 The next step of the process then consists of a mixing step 5 for mixing the selected yarns which are placed on a conveyor belt 5a, indicated in the diagram, or which are transported to the successive conversion
20 steps. In the case of yarns 3a, 3b, the mixture may simply comprise equal percentages thereof. In the case of the use of other types of yarn, it is necessary to choose and meter the quantities so that, in the mixing step, the mean diameter of the yarns is between ten and
25 fifteen micrometres, or is close to the optimum value.

 In all cases, it is advantageous to select and mix only E-grade glass yarns 3 having diameters greater than a minimum diameter of five micrometres and less than a maximum diameter of twenty-four micrometres.

30 The yarns, even of greater length, are then reduced into fragments or filaments 2 of length at least mostly greater than a minimum length of six millimetres and less than a maximum length of twenty millimetres.

35 This operation is carried out in the milling step 6, during which the yarns 3a, 3b are chopped in a chopper 6a with rotating blades, shown schematically by a few blades, or in any other suitable apparatus.

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Preferably, the milling is carried out so as to obtain stubs or filaments 2 having a mean length of between ten and twelve centimetres.

The milling of the yarns has the consequence
5 that the chopped filaments 2 agglomerate or become entangled in the form of flakes.

Various other operations may be combined with the milling step 6.

For example, an initial fragmentation of the
10 yarns, if they are received as a compact mass or if they have particularly long lengths, so as to facilitate the following milling step.

It is also opportune to carry out a screening
15 step through a screen with calibrated holes, making it possible to obtain chopping uniformity.

After the milling step 6, the production of the fibrous material 1 is almost complete, as shown schematically in box 7 in which the reference number 2 indicates the filaments thus produced. The material 1
20 may be stored in a silo or stored in any other appropriate manner.

Before storing the material, it is opportune to carry out an additional step of de-ironing the fibre so as to remove particles of iron which could have been
25 introduced during the manufacturing steps described above, particularly during the milling.

Finally, the figure shows a packing step 8 during which the reinforcing fibre 1 is put, for example, into meltable bags 8a.

30 It is also envisaged that the material be packaged, as shown in box 9, in the form of large-sized bales 9a obtained using presses or other devices.

The packaging may also be carried out just after milling or before storage.

35 As already mentioned, the use of the fibre 1 entails incorporating it as a reinforcing material into bituminous mixes for road pavements.

These mixes are essentially a mixture of inert materials and bitumen.

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For example, in the case of bituminous mixes of the "draining" or "antiskid" type, the inert materials are mixtures of crushed basaltic stone, sand and a filler, while the bitumen is of the high-viscosity modified type.

In detail, an optimum composition of an "antiskid" mix is as follows:

- inert material: 77% crushed basaltic stone, 14% sand, 9% calcareous filler;
- high-viscosity modified bitumen: barely 5.5% of the weight of the above inert material.

The fibre 1 is introduced into this mix in a quantity of between two and five per cent of the total weight of the inert material.

The invention has major advantages.

Firstly, the fibre obtained, because of its dimensions, its strength and its flexibility, and given that it is an inert material like glass, it is not a health hazard, it cannot be inhaled and it may be disposed of as non-hazardous waste.

Secondly, the fibre forms a fixed reinforcement or three-dimensional network within the mix, with the effect that the volume occupied by the bitumen is increased, the resistance to cracking and the tensile strength are appreciably improved and the shear forces under dynamic loads are absorbed.

These characteristics do not vary over time and the glass proves to be insensitive to the presence of water.

The process also allows these fibres to be produced at a lower cost than that of the known fibres mentioned in our introduction, particularly because the raw material can be obtained from production scrap or waste.

The reliability, the mechanical effectiveness and the reduced cost have the overall consequence that it is possible to reduce the frequency of road pavement repair, or to produce effective courses of reduced

thickness, or to increase the pavement area without increasing the total cost.

5 The reinforcing fibre according to the invention also guarantees that the fibres are uniformly distributed in the mix thanks to its optimum dimensions defined by the said mean diameter and mean length which put it into equilibrium in the bitumen.

10 In addition, in the preferred case of a fibre consisting of a mixture of filaments of different diameters, rapid mixing and dispersion of the fibre are also obtained in the field indicated: the various filaments are distributed spontaneously and rapidly at all levels of the mix.

15 The mean length chosen then gives excellent results with regard to the ability to ensure cohesion and integrity: it binds vast portions of mix and does not give rise to filament fragmentation.

20 Furthermore, the substantially homogeneous network formed by the fibres prevents the bitumen from flowing out of the mix down to the bottom of the tanks of lorries, thus avoiding any loss of this bitumen and any modification of the optimum composition of the mix.

25 The invention described above in its preferred embodiment is capable of many modifications and variants which all fall within the scope of the inventive concept. Furthermore, all the details may be replaced with technically equivalent elements.

CLAIMS

1. Fibrous reinforcing material for bituminous mixes used for road pavements, characterized in that it is obtained mostly from glass filaments (2) having a diameter of greater than or equal to five micrometres and a length of greater than or equal to six millimetres.
2. Fibrous reinforcing material according to Claim 1, characterized in that it is in the form of flakes (1).
3. Fibrous reinforcing material according to Claim 1 or 2, characterized in that the said filaments (2) are made of E-type glass consisting essentially of calcium aluminium borosilicate with a low alkali content.
4. Fibrous reinforcing material according to one or more of the preceding claims, comprising a mixture of glass filaments (2) of different diameters.
5. Fibrous reinforcing material according to Claim 4, comprising glass filaments (2) of two different diameters in approximately equal quantities by weight.
6. Fibrous reinforcing material according to one or more of the preceding claims, in which the said glass filaments (2) come from chopped glass yarns (3).
7. Fibrous reinforcing material according to one or more of the preceding claims, in which the said glass filaments (2) have a minimum diameter of greater than or equal to five micrometres and a maximum diameter of less than or equal to twenty-four micrometres.
8. Fibrous reinforcing material according to Claim 7, in which the said filaments (2) have a mean diameter of between ten and fifteen micrometres.
9. Fibrous reinforcing material according to one or more of the preceding claims, in which the said filaments (2) have mainly a so-called minimum length of

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greater than or equal to six millimetres and a maximum length of less than or equal to twenty millimetres.

10. Fibrous reinforcing material according to Claim 9, in which the said filaments (2) have a mean
5 length of between ten and twelve millimetres.

11. Process for manufacturing a fibrous reinforcing material for bituminous mixes used for road pavements, characterized in that it comprises: a selection step
10 (4) in which glass yarns (3) consisting of filaments (2) having a diameter greater than or equal to a minimum diameter of five micrometres and less than or equal to a maximum diameter of twenty-four micrometres are chosen; and a milling step (6) during which the
15 said yarns are chopped into filaments (2) having mostly a length of greater than or equal to six millimetres.

12. Process according to Claim 11, in which, in the said selection step (4), the said glass yarns (3) are chosen from production scrap or waste.

13. Process according to Claim 11 or 12, in which,
20 in the said selection step, yarns (3) made of E-grade glass are chosen.

14. Process according to one or more of Claims 11 to 13, in which, in the said selection step, "textile" glass yarns (3a) and "roving" glass yarns (3b) are
25 chosen.

15. Process according to Claim 14, in which the said yarns (3a, 3b) are metered in approximately equal quantities by weight.

16. Process according to one or more of Claims 11 to 15, in which yarns (3) of different diameters,
30 chosen so as to obtain a mean diameter of between ten and fifteen micrometres, are selected.

17. Process according to one or more of Claims 11 to 16, in which, during the milling step (6), the said
35 yarns (3) are chopped into filaments (2) having a mean length of between ten and twelve millimetres.

18. Process according to one or more of Claims 11 to 17, in which, in the milling step (6), the chopped filaments (2) agglomerate in the form of flakes (1).

19. Process according to one or more of Claims 11 to 18, in which the milling step (6) is carried out using a chopper (6a) with rotating blades.

5 20. Use of a fibrous material according to one or more of Claims 1 to 10 or produced according to one or more of Claims 11 to 19, characterized in that the said fibrous material (1) is incorporated as reinforcing material into bituminous mixes for road pavements.

10 21. Bituminous mix for road pavements, of the type comprising bitumen and a mixture of inert materials, characterized in that it contains a fibrous reinforcing material (1) according to one or more of Claims 1 to 10 or produced according to one or more of Claims 11 to 19.

A fibrous reinforcing material (1) is envisaged which is produced from glass filaments (2), advantageously consisting of fragments of glass yarns (3) or of chopped yarns, having a mean diameter of greater than five micrometres and a mean length of greater than six millimetres. The process comprises a selection step (4a, 4b) during which the glass yarns (3) consisting of filaments having a diameter greater than or equal to five micrometres and less than or equal to twenty-four micrometres are chosen, optionally a step (5) of mixing the selected yarns, and a milling step (6) during which the mixed yarns are chopped into filaments (2) having a length of greater than or equal to six millimetres. Advantageously, the fibrous material is in the form of flakes.

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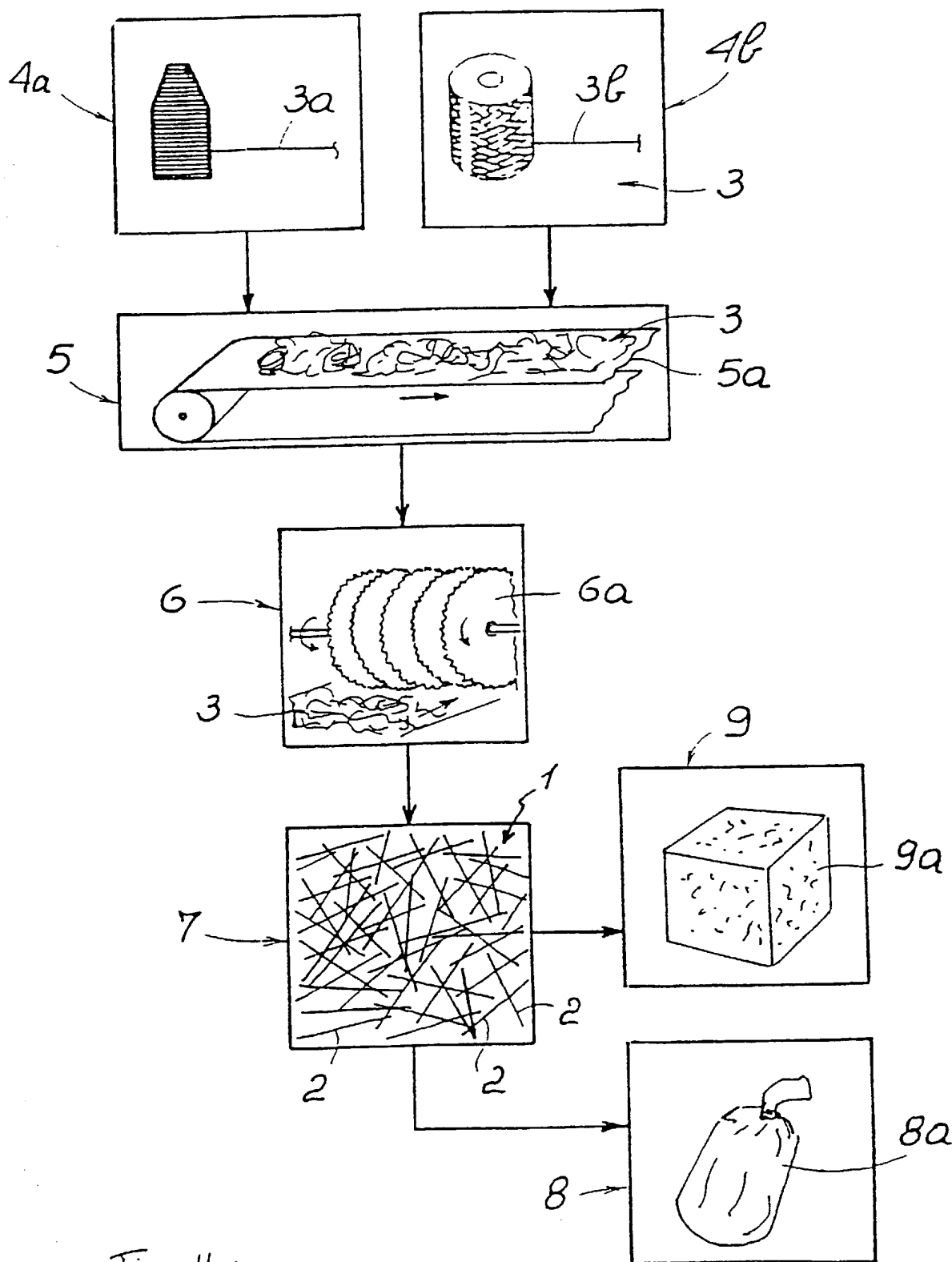


Fig. Unique

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EC 4 9908: CT/1-3

214771US0PCT

Declaration and Power of Attorney for Patent Application

Dichiarazione e procura ai fini della domanda di brevetto

Italian Language Declaration

Il sottoscritto inventore dichiara che :

La propria residenza recapito postale e cittadinanza corrispondono a quanto indicato in calce, sotto la propria firma.

Ritiene di essere il primo ed unico inventore originale (se viene elencato in calce un solo nominativo) o il coinventore primo ed originale (se è elencato più di un nominativo) del oggetto rivendicato e per il quale il sottoscritto presenta domanda di brevetto. La invenzione in questione è chiamata.

e la sua descrizione è allegata alla presente
Dichiarazione a meno :

☐ è qui allegato

☐ Il _____

è stata depositata una domanda di brevetto
statunitense numero o una domanda di brevetto
internazionale PCT numero

_____ che è stata modificata il

_____ (se applicabile).

Il sottoscritto dichiara in oltre di aver letto e compreso il contenuto della descrizione identificata in precedenza, rivendicazioni comprese, come modificati dall'eventuale modifica summenzionata.

Il sottoscritto riconosce l' obbligo di rivelare informazioni essenziali ai fini della determinazione della brevettabilità ai sensi del Titolo 37, Codice dei Regolamenti Federali, § 1.56.

As a below named inventor, I hereby declare that:

My residence, mailing address and citizenship are as stated next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled.

REINFORCING FIBRE MATERIAL FOR BITUMINOUS
AGGREGATES, METHOD FOR PRODUCING SAME AND
USE (as amended)

the specification of which

☐ is attached hereto.

☒ was filed on October 12, 2001

as United States Application Number or PCT
International Application Number

09/926,318 and was amended on

_____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

28. MAI. 2002 15:07

ST GOBAIN 00148395562

0000263113 N° 775-14p. 4

ST GOBAIN

Italian Language Declaration

Il sottoscritto rivendica con la presente la priorità prevista dal Titolo 35, Codice degli Stati Uniti, § 119(a)-(d) o § 365(b) in relazione a qualsiasi domanda o domande estere di brevetto o certificato di inventore, o dal Titolo 35, § 365(a) degli stessi Codice in relazione a qualsiasi domanda internazionale PCT nella quale è designato almeno un paese diverso dagli Stati Uniti, i suddetti domande e certificati essendo elencati sotto, e, spuntando le seguenti caselle, ha anche identificato sotto qualsiasi domanda estera di brevetto o certificato di inventore, o domanda internazionale PCT, la cui data di deposito preceda quella dalla domanda per la quale è rivendicata la priorità.

Prior Foreign Application(s)
(Domande Estere Anteriori)

Priority Claimed
Diritto di priorità
rivendicato

MI99A 000767Italy

(Number)
(Numero)

(Country)
(Nazione)

14 April 1999

(Day/Month/Year Filed)
(Giorno/Mese/Anno di deposito)

☒ ☐
Yes No
Sì No

Il sottoscritto rivendica con la presente i benefici previsti dal Titolo 35, Codice degli Stati Uniti, § 119(a), in relazione a qualsiasi domanda o domande provvisorie degli Stati Uniti elencato sotto.

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below.

(Application No.)
(della domanda)

(Filing Date)
(Data di deposito)

(Application No.)
(della domanda)

(Filing Date)
(Data di deposito)

Il sottoscritto rivendica con la presente i benefici previsti dal Titolo 35, Codice degli Stati Uniti, § 120, in relazione a qualsiasi domanda o domande statunitensi, o dal Titolo 35, § 365(c) degli stessi Codice in relazione a qualsiasi domanda internazionale PCT nella quale sono designati gli Stati Uniti, i suddette domande essendo elencate sotto e, nella misura in cui l'oggetto di ciascuna rivendicazione di questa domanda non sia stato esposto nella domanda statunitense o internazionale PCT anteriore nel modo previsto dal primo paragrafo del Titolo 35, Codice degli Stati Uniti, § 112, riconosce l'obbligo di rivelare informazioni essenziali ai fini della determinazione della brevettabilità ai sensi del Titolo 37, Codici dei Regolamenti Federali, § 1.56, le quali diventino disponibili durante il periodo compreso tra la data di deposito della domanda anteriore e la data di deposito nazionale o internazionale PCT della presente domanda.

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT international application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

PCT/FR00/00937April 12, 2000

(Application No.)
(della domanda)

(Filing Date)
(Data di deposito)

(Status: Patented, Pending, Abandoned)(Stato: concessione di brevetto, in corso di esame, abbandono)

(Application No.)
(della domanda)

(Filing Date)
(Data di deposito)

(Status: Patented, Pending, Abandoned)(Stato: concessione di brevetto, in corso di esame, abbandono)

Con la presente, il sottoscritto dichiara veritiere tutte le affermazioni contenute in questa domanda in relazione alle proprie conoscenze e di ritenere vere tutte le affermazioni o informazioni presentate. Dichiara inoltre che tali asserzioni sono state espresse nella piena consapevolezza che le dichiarazioni internazionalmente false sono punibili con una multa, l'incarcerazione o entrambe, ai sensi della Sezione 1001 Titolo 18 del Codice degli Stati Uniti e che tali dichiarazioni intenzionalmente false possono mettere a repentaglio la validità della domanda o di qualsiasi brevetto rilasciato in merito.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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00025313 N° 779-14p. 5

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PROCURA: Il sottoscritto inventore nomina con la presente il seguente avvocato o avvocati e/o agente o agenti al fine di istruire questa pratica e di condurre tutte le operazioni ad essa pertinenti presso l'Ufficio dei Brevetti e Marchi di Fabbrica : (Elencare il nome ed il numero di matricola).

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: (list name and registration number)

**022850**

Inviare le corrispondenza a:

Send Correspondence to:

**022850**

Telefonare a: (Nome e numero telefonico)

Direct Telephone calls to: (name and telephone number)

(703) 413-3000

Nome e cognome dell'unico o del primo inventore	Full name of sole or first inventor
Firma dell'inventore	Inventor's signature
Data	Date
Residenza	Residence
Cittadinanza	Citizenship
Recapito postale	Mailing Address
	same as above

Francesco Rossi 10/6/02
Viale Europa, 44/2, Spoltorno I-17028, Italy
Italy
ITX

Nome e cognome dell'eventuale secondo coinventore	Full name of second joint inventor, if any
Firma del secondo coinventore	Second inventor's signature
Data	Date
Residenza	Residence
Cittadinanza	Citizenship
Recapito postale	Mailing Address
	same as above

Antonio Ferrante 10/6/02
Via Ippolito Nievo, 19, Milano I-20145, Italy
Italy
ITX